

Math 116 Section 04

Quiz 10

Name _____

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Student Number _____

All solutions are to be presented on the paper in the space provided. The quiz is open book. You can discuss the problem with others and ask the TA questions.

(1) Evaluate the following limits:

(a)

$$\begin{aligned}\lim_{x \rightarrow 0} \frac{1 - \cos(2x)}{1 - \cos(3x)} & \stackrel{0}{=} \lim_{x \rightarrow 0} \frac{2 \sin(2x)}{3 \sin(3x)} \\ & \stackrel{0}{=} \lim_{x \rightarrow 0} \frac{4 \cos(2x)}{9 \cos(3x)} \\ & = \frac{4}{9}\end{aligned}$$

(b)

$$\begin{aligned}\lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{xe^{2x}} \right) & \stackrel{\infty - \infty}{=} \lim_{x \rightarrow 0} \left(\frac{e^{2x} - 1}{xe^{2x}} \right) \\ & \stackrel{0}{=} \lim_{x \rightarrow 0} \left(\frac{2e^{2x}}{e^{2x} + 2xe^{2x}} \right) \\ & = 2\end{aligned}$$

(2) Prove $\lim_{x \rightarrow 2} (2x - 1) = 3$. First, find δ .

$$|(2x - 1) - 3| < \epsilon$$

$$|2x - 4| < \epsilon$$

$$2|x - 2| < \epsilon$$

$$|x - 2| < \frac{\epsilon}{2}$$

Let $\delta = \frac{\epsilon}{2}$. Then, work the series of equations backwards:

$$|x - 2| < \delta = \frac{\epsilon}{2}$$

$$2|x - 2| < \epsilon$$

$$|2x - 4| < \epsilon$$

$$|(2x - 1) - 3| < \epsilon$$